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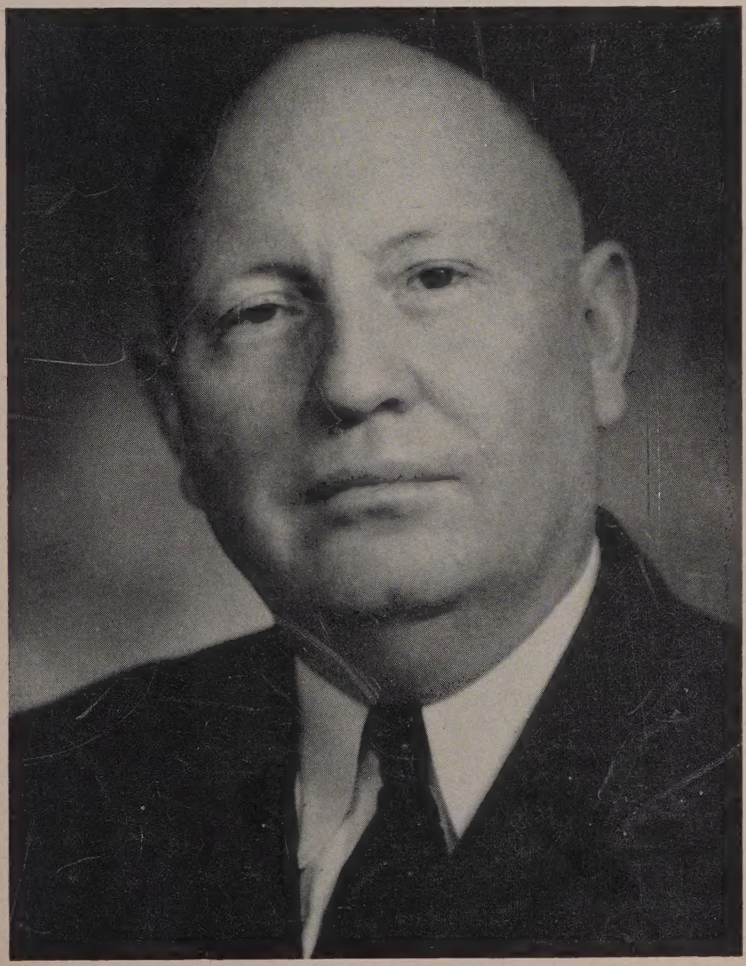

BAYARD FRANKLIN FLOYD

SOME DRAGONFLIES OF EARLY SPRING IN SOUTH FLORIDA

By JAMES G. NEEDHAM

This is brief summary of the results of two months' collecting for Odonata in and about the Archbold Biological Station in Highlands County, Florida. During March and April of 1945 I was privileged to make that Station my field headquarters. I was given much aid toward getting to the lakes and streams of the interesting region round about. Mr. Richard Archbold took me to the more distant collecting places and helped me in many ways besides. Mr. Simeon Walter gave me many a ride to lakes that lay along his daily route of travel for the Station. Mr. Leonard J. Brass, botanist for the Station, often went out with me, and was an excellent co-laborer, assistant and guide. Mr. Dennis Hinchey went collecting with me a number of times, and brought me many fine specimens of adult dragon flies. The atmosphere of the Station was altogether congenial and helpful.

The best season for collecting well grown nymphs was at hand when I arrived on March first. A protected pool of running water near the laboratory provided a safe place to set my rearing cages. I was able to bring a considerable number of nymphs to their adult stages, and to add something to our knowledge of dragonfly life histories. This paper is a brief statement of what I found in the region about the Station.[1]

A few notes on the breeding grounds of the dragonflies found may be of use to future collectors in that region. I did most of my collecting in the clear sand-bottomed lakes that nestle among low hills in Florida-scrub vegetation. I sampled a few spots on the shores of a dozen lakes. I was able to make several trips to Lake Placid, but only one stop of an hour or two at each of the others. None was within easy walking distance of the Station, and war-time restrictions on the use of tires and gasoline hindered getting about. I collected in four streams and in several drainage ditches. I will first briefly mention some characters of my collecting places, and then I will add a locality list of the 55 species of dragonflies collected.

The lakes that I visited varied greatly in size. Lake Istokpoga, the largest, is some ten miles long and nearly as wide.

[1] For a brief notice of some of the ecological features of that region see *Science* 100: 594, 1944.

In descending order Lakes Placid, Stearns and Jackson are each about three miles across. Next come Lakes Huntley and Grassy, each about two miles long and half as wide. The other six are smaller, but not too small for heavy wave action on their shores in times of storm. In outline the smaller lakes tend to be saucer shaped in circumference and in depth. All of the lakes are shallow; one may wade out far from shore in all of them, and at almost all points in the shore of most of them. Where the banks are lowest the dense vegetation of bordering swamps edges out into the water. All these lakes, and the streams as well, are shown on the current county map of Highlands County, Florida.

The lake shores are fringed almost everywhere with rooted aquatic vegetation. The principal component of the outer vegetation zone in the deeper water is a grass of the genus *Panicum* (*P. nemitomon*). It spreads by long runners, buried in the sand and rooting at the nodes. It sends up thin and pliant, waist-high, leafy stems. These stems stand in open order. They sway in the wind and rise again unharmed when beaten down by the waves; there is no entanglement of them to impede one's wading about. They thinly occupy broad belts of the shore in a nearly pure stand.

This panic grass is sometimes replaced by, but more often intermixed at its border with, the stubby sedge, *Fuirena scirpoidea*. The sedge tends to keep more closely to the shore. Its strongly rooted runners lie on top of the sand. They run criss-cross, and become interlaced in a wide-meshed pattern of polygons. The stems are often badly broken and reduced to stubs by wave action.

These two plants, panic grass and sedge, together provide the main shelter for bottom-dwelling dragonfly nymphs in the lakes. By their strong roots they hold the sand and make a *terra firma* of it, where nymphs of several genera may dwell. The nymphs of *Celithemis* sequester themselves at the bases of the erect stems. They stick so closely to shelter that few of them are taken in a rake-net sweeping the bottom, but after transformation their cast off skins are left hanging in the grass stems in great abundance. Nymphs of two species of damsel flies, *Enallagma sulcatum* and *E. durum* seek the same shelter, and are even more difficult to dislodge with a rake net.

The nymphs of *Gomphus cavillaris* burrow in the sand in the intervals unoccupied by the roots of the plants. When the

vegetation zone is wide they climb the stems of the plants to transform, but when it is narrow and more open they seem to prefer to crawl out on shore and leave their cast-off skins lying flat on the sand just beyond the farthest reach of the waves.

The nymphs of *Progomphus alachuensis,* superb burrowers, seek more open spaces where there is some shifting of the sand in storms. Their tracks may be found in the wider intervals between the grass roots; more abundantly in sand bars, and in the bare beds of shore pools. Their tracks are like those of moles in miniature. The sand is scraped aside by the fore and middle legs, and the roof of the burrow is lifted by the wedge-shaped head. There is this difference: the upturned end of the abdomen, that lifts the caudal respiratory opening up to clear water for respiration, as drawn forward, cleaves the roof of the burrow and leaves a little groove down the middle of it.

The nymphs of *Progomphus* move shoreward as they near the time of transformation. They generally leave their skins lying flat on the sand of the shore. Only rarely will one climb a pier or other vertical support, and then that support must be far out from shore and must have a rough surface into which the nymph may hook its claws.

The huge nymphs of *Didymops floridensis,* that can live only lying flat upon the sand of the lake bed, must have room for the spread of their long legs. They probably live in the deeper water, out where I did no collecting, beyond the panic-grass zone. I caught no nymphs, save for one taken in transformation, but found many cast-off skins in the edges of all the smaller lakes. Any post or pier that projected well above the water attracted these wide-bodied sprawlers, and was likely to be besprinkled with their emply skins. Lacking such broad supports, the nymphs make shift to clamber up grass or sedge stems when several of these stand close enough together to accommodate the wide reach of their legs. Very few of them go as far as the shore for transformation.

On sheltered spots in the lake shores, where pickerel weed (*Pontederia*) and bonnets (*Nelumbo*) flourish, conditions are entirely different and more like those in small weedy ponds and ditches. My collecting was mostly done on sandy shores where wading was possible.

The streams in which I collected nymphs were all sandy-bottomed and muck-bordered and bedded. Wading was best at the edge of the water where (in this season of extreme

drouth) there was generally a footing of compacted bare sand. On either side was muck: soft black muck. Over the few sand bars the water was coffee colored; over the muck it was black as jet.

The largest of the streams visited, Fish-eating Creek, some sixteen to twenty miles from its mouth, was reduced by the drouth to a series of long muck-bottomed pools. Arbuckle Creek was similar but smaller, with continuing slow current. The best collecting for nymphs was found in two smaller streams: Josephine Creek at State Highway No. 8 and Yellow Bluff Creek at the crossing of the road that runs eastward from DeSoto City.

The drainage ditches presented conditions approaching those of weed-choked small ponds, and sheltered much the same sort of dragonfly fauna. They varied in size from that of a big canal near Moorehaven to the little concrete-lined ditch that runs through the Station grounds. Muck bottoms and steep sandy sides characterized all the larger ditches.

Two ponds are worthy of mention: two of very different character. One of them afforded good collecting. It was situated in the pine flat woods a mile and a half walking-distance from the Station. It was broad and very shallow. Reduced at least nine tenths in area by the drouth, it still covered an area of several acres. Lacking a name, and because its waters were densely filled over a large part with the coarse loose-jointed bog moss, *Sphagnum macrophyllum*,[2] I refer to it in the following list as Big Sphagnum Pond.

The other pond was smaller and deeper. It is situated in an orange grove in the northwest quarter of the city of Lake Placid. The shores of this pond were difficult of approach, because of a zone of head-high bracken fern and a tangle of tough vines; and it was hard to collect from, because of a floating border that would not sustain's one's weight. *Libellula auripennis* was common there, but hard to catch.

There was another altogether unique collecting place for dragonflies directly in the Station building. The machine shop is an excellent trap for wide ranging species. It has a wide door that stands open most of the time, and high above the door near the roof is a large window. Dragonflies speed in at the door, and seeing the flood of light from above, they try to fly out at the window; and there they become entangled in

[2] Determined for me by Dr. A. J. Grout.

the webs of spiders spun in the angles of the window panes. Their blood is sucked, but their wings and other hard parts, by which they may readily be recognized, remain and accumulate in copious layers of dust-besprinkled spider silk. With Mr. Dennis Hinchey's aid and by use of a long bamboo pole, I obtained specimens of fifteen species from that window—more species than I got from any other single collecting place visited. These species are marked with an asterisk (*) in the following list. The list includes 55 species.

LOCALITY HABITAT LIST

Anisoptera

1. Aphylla williamsoni—Drainage canal near Moorehaven: exuviae on leaves of stranded water hyacinths
2. Progomphus alachuensis—Lakes, especially the larger ones
3. Gomphus australis ?—Nymph only: Red Bluff Creek
4. Gomphus cavillaris—Lakes everywhere
5. Gomphus minutus—Fish-eating Creek in black muck
6. Gomphus plagiatus—Lakes Red Bluff and Istokpoga
7. Hagenius brevistylus—Josephine Creek: nymph only

*8. Gomphaeschna antilope—Fish-eating Creek: not common

*9. Anax junius—High flyer: nymph in coarse water weeds

*10. Coryphaeschna ingens—High flyer: common: nymph among coarse weeds

*11. Nasiaeschna pentacantha—Outlet of Lake Annie: Fish-eating Creek

*12. Gynacantha nervosa—Crepuscular: adults only seen

13. Macromia taeniolata—Outlet of Lake Annie: reared: young nymphs common in Yellow Bluff Creek
14. Didymops floridensis—Lakes: abundant in Lake Placid
15. Neurocordulia species ?—Outlet to Lake Annie: Yellow Bluff Creek
16. Epicordulia princeps—Canal near Moorehaven
17. Epicordulia regina—Fish-eating Creek

*18. Somatochlora filosa—Station machine-shop window

19. Tetragoneuria cynosura—Yellow Bluff Creek
20. Tetragoneuria stella—Outlet of Lake Placid
21. Perithemis seminole—Slow streams and ditches: abundant on water hyacinths at edges of canal near Moorehaven
22. Celithemis bertha—Lakes: abundant on Grassy Lake
23. Celithemis eponina—Lakes everywhere
24. Celithemis fasciata—Lake Placid: panic grass zone
25. Celithemis ornata—Big Sphagnum Pond: not common

*26. Erythemis simplicicollis—Everywhere

27. Erythrodiplax berenice—Brackish water

*28. Erythrodiplax minuscula—Small ponds: keeps well to the weeds

29. Ladona deplanata—Common in Big Sphagnum Pond

*30. Libellula auripennis—High window in machine shop, station premises

*31. Libellula axillena—Roadside ditch at Parker Islands

*32. Libellula incesta—Ditch on station premises
*33. Libellula needhami—Ditch on station premises
34. Orthemis ferruginea—Henscratch Road clay pit
35. Cannacria gravida—Ponds and ditches: nymph among water weeds
*36. Pachydiplax longipennis—Everywhere
*37. Miathyria marcella—Machine-shop window
38. Tramea carolina—Pond species: high flyers: general
39. Tramea lacerata—Pond species: high flyers: not common
*40. Pantala flavescens—A cosmopolitan pond species

Zygoptera (Damsel flies)

41. Agrion dimidiatum—Streams: abundant in Yellow Bluff Creek
42. Agrion maculatum—Ditch on station premises
43. Hetaerina titia—Josephine and Arbuckle Creeks
44. Lestes vigilax—Big Sphagnum Pond
45. Argia fumipennis—Everywhere
46. Argia moesta—Josephine Creek
47. Argia sedula—Josephine Creek
48. Nehalennia integricollis—Punk Tree Lane between Lakes Placid and Sirena: roadside ditch
49. Enallagma doubledayi—Lake Placid: not common
50. Enallagma cardenium—Outlet of Lake Annie: a stream species
51. Enallagma concisum—Big Sphagnum Pond: not common
52. Enallagma pollutum—Fish-eating Creek and canal near Moorehaven
53. Enallagma sulcatum—Lakes; in the panic grass zone
54. Ischnura ramburii—Everywhere
55. Anomalagrion hastatum—Seepage areas of dwarf spike-rush, etc.

Two species of the preceding list were collected only from the shop window: the big Southern *Somatochlora filosa* and the slender Neotropical *Miathyria marcella* that I once before recorded from Florida (*Entom. News* 44: 98, 1933), and that had earlier been taken by Professor C. T. Reed at Kingsville, Texas. There were two species found in the window in far greater numbers than all the others: the elusive *Gynacantha nervosa* that flies at nightfall, and the ubiquitous and familiar *Pachydiplax longipennis* that flies by day.

I left off collecting at the Station on April 23, before the late-season species had put in an appearance. *Celithemis fasciata* was just beginning emergence (*eponina, ornata, bertha* and *fasciata* being the chronological order of appearance in that genus), and *Didymops floridensis* was practically at the end of its season of flight. At that date I had seen only a single specimen of *Lestes*, no *Plathemis* at all, and only nymphs of *Tetragoneuria*.

The
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J. R. WATSON, Gainesville.....*Editor*
G. B. MERRILL, Gainesville.....*Assistant Editor*
C. B. WISECUP, Box 3391, Orlando.....*Business Manager*

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U. C. LOFTIN DIES

On January 16, our Society lost another of its beloved members in the death of U. C. Loftin, which occurred in Washington, D. C. He died of a heart attack at the age of 55. All of our members who attended the University during the years 1910-1913 will remember Mr. Loftin. He was a graduate student in the University and an assistant in the Department of Entomology of the Experiment Station during those years, receiving his master's degree in 1913. His thesis was on the distribution of mosquitoes, particularly as to the time of year when different species were most abundant. For this purpose, he ran an extensive line of traps. A copy of his thesis is in the University Library. Mr. Loftin was dearly beloved by all those with whom he was associated.

The 8 years following the receipt of his master's degree were spent in research on insects of cotton and sugar cane for the Bureau of Entomology of the U. S. Department of Agriculture, working in Louisiana and Texas. In 1921, he was employed as manager of the Tlahualilo Agricultural Company of Mexico, a position which he held until 1928. He then served one year as Entomologist of the Cuba Sugar Experiment Station at Baruga. Early in 1931 he returned to the Bureau of Entomology of the Department of Agriculture as investigator in Puerto Rico and the Virgin Islands. In that year he was

called to Washington as Assistant Head of the Division of Cotton Insect Investigation under Dr. R. W. Harned.

Mr. Loftin was born at Mt. Olive, North Carolina, July 2, 1890. He graduated from the North Carolina State College in 1910. Mr. Loftin was one of the first to recognize the importance and seriousness of the white fringed beetle outbreak in Florida and Alabama. Besides the Florida and Texas Entomological Societies, he was a member of the American Association for the Advancement of Science, the American Association of Economic Entomologists and the Entomological Society of America.

He is survived by his wife, Mrs. May LeBeuf Loftin, his son, Lt. U. C. Loftin, Jr., of the U. S. Army Air Corps, his daughter, Aimee Loftin and his mother, Mrs. J. O. Loftin, together with 5 sisters and 3 brothers. His loss will be keenly felt and regretted by all who knew him.

A recent bulletin from the Estacion Experimental Agronomica, at Santiago de las Vegas, Cuba will be of much interest to entomologists, especially to those of us in Florida, "Catalogo de los Insectos que Atacan a las Plantas Economicas de Cuba" by Dr. S. C. Bruner, L. C. Scaramuzza and A. R. Otero. The insects are recorded under the names of the hosts. This, with a supplement, occupies 189 pages and should be very interesting to anyone interested in the insects of economic plants in Cuba. There are 12 plates illustrating Cuban insects. And then follows an index in which the insects are recorded in order, which occupies 11 pages. Three pages are given over to the index of the predators and parasites of these insects attacking cultivated crops. Nine pages are occupied by our index of the common names of the plants.

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SOME AUGUST SKIPPERS OF THE GREAT SMOKY MOUNTAIN NATIONAL PARK AND VICINITY

J. R. WATSON

During August of 1942 and again of 1944 and 1945, it was the writer's privilege to study the skippers of the Great Smoky Mountain National Park and vicinity, especially in Gatlinburg, Tennessee. All skippers recorded, if not in the park, were collected within a mile or two of the park and undoubtedly occur in the park. The inability to bring up an automobile in 1944, restricted much of the author's collecting to the city of Gatlinburg, although Mr. Arthur Stupka, park naturalist was most cooperative in furthering the work. Any success we may have had was due largely to his help and encouragement. There were in the collection of the park naturalist, fourteen species of skippers. Those of this list, not in the collection, are starred. Duplicates, however, of most of them will be placed in the collection.

(1) *Epargyreus clarus* (Cramer) *E. tityrus* Fab., Silver-spangled Skipper. This is one of the most common skippers in the park, during August; the most common in 1944 but in 1945 yielded first place to *Polites* (Atalopedes) *campestris*. It is particularly common in the lower part of the park around Gatlinburg, but was taken at higher elevations including Indian Gap.

*(2) *Urbanus proteus* (Linn.), Long-tailed Skipper, adult of the bean leaf-roller. Two of these were seen in 1944 on the hotel grounds at Gatlinburg, at flowers within a half mile of the park. The writer had no net at the time and they were not captured but this skipper cannot be confused with any other, so there can be no doubt of its presence in the park although it is by no means common. It is relatively rare as compared with points further south, especially Florida, where, in August, it would be our most common skipper. A southern species, it has been reported from New York and Alberta, Canada.

(3) *Thorybes bathylus* (Smith and Abbot), the Southern Dusky-wing. Taken at *Lespedezia* near headquarters in the park, on August 24, 1944, and August 9, 1945.

*(4) *T. confusus* Bell, Bell's Dusky-wing. Taken at Lespedezia at headquarters August 19, 1944, and in Gatlinburg on August 17 and 24, 1944.

(5) *Achalarus lycides* (Smith and Abbot), the Hoary Edge. Taken near headquarters on the 19th and also at the hotel grounds in August 1944; at Elkmount on August 19, 1942. There were more in 1945. This does not seem to be a common skipper anywhere, at least not in Florida.

*(6) *Hesperia communis* (Grote) (*H. tessellata* Scud.), Common Checker-spot. Taken throughout the extent of the park; from Gatlinburg to Clingman's Dome (8/21/42; not nearly as common as it would be in Florida in August. *H. syrichtus* (Fab.), the Blue-gray Skipper, which would be equally common in Florida, was not seen in the park.

*(7) *Pholisora catullus* (Fab.) The Sooty-wing. Taken at Gatlinburg on flowers, 8/14/44 and 8/24/44.

*(8) *Thanaos martialis* (Scud.) August 11, 1945.

(9) *Erynnis juvenalis* (Fab.) (*Thanaos juvenalis*) Juvenal's Dusky-wing. Taken at the Ashhopper Branch on August 15, 1942.

(10) *Erynnis horatius* (Scudder and Burgess), 8/12/45 at 5,000 ft. level.

*(11) *Ancyloxypha numitor* Fab. The least Skipper. This, the smallest of the skippers, was taken at Gatlinburg on August 18, 29, and 30, 1944, at a swampy spot where the LeConte Creek joins the Little Pigeon River. A very common skipper in Florida but confined to low ground along streams. It would be expected to occur in Cade's Cove and other suitable localities (moist to swampy) but a diligent search on August 13, 1945 failed to reveal its presence there.

*(12) *Hylephila phylaeus* (Drury). The Fiery Skipper. Taken on the Greenbrier Road, 8/12/42; at the hotel grounds, 8/21/44—three specimens in Gatlinburg, within a stone's throw of the park boundary, 8/27/44; and along Bascome Creek, 8/30/44. This is a southern type, very abundant in Florida. It extends as far south as Patagonia. Its larvae feed on grasses. Cade's Cove, 8/13/45—2 males.

Polites brettus (Baisd and Lee). The Whirl-about. A southern type, whose males are very similar, very common in Florida, was not taken.

(13) *Polites verna* (Edw.) The Little Glass-wing. Taken on *Lespedezia* in the park near headquarters, 8/8/42; 8/9/45; 8/16/44; 8/30/44 and 8/21/44; on Greenbrier Road, 8/12/42, at clover bloom; 8/16/42, Elkmount Road, inside the park; and Clingman's Dome, 8/21/42; on ironweed, 8/21/44 at Ashhopper Branch. It was very much more common, apparently in 1942 than it was in 1944 or 1945. A northern type, which, however, is occasionally taken in Florida.

(14) *P. manataaqua* (Sand.) The Cross-line Skipper. At Cade's Cove, 8/28/44. This is a northern type that extends into Canada.

*(15) *P. peckius* (Kirby). Peck's Skipper. Clingman's Dome, 8/21/42. A widely distributed species extending from Canada to Central America.

*(16) *P.* (*Atalopedes*) *campestris* (Boisd.) The Sachem was the most common Skipper in the region in 1945. It was especially numerous at blossoms of ironweed. It was also taken at a mud puddle on August 26, 1942 and at *Eupatorium* blossoms at an elevation of 4,000 feet on August 26, 1942. It is more common in the lower altitudes than higher up. In 1945, males predominated up to August 15, females after that date.

*(17) *Catia otho egerement* (Scud.) is called the Otho Skipper, taken near headquarters, 8/12/44.

*(18) *Atrytone ruricola* (Boisd.), the Dun Skipper, at Ashhopper Branch, 8/25/42, 8/11/45 and 8/9/44.

(19) *Poanes zabulon*, the Zabulon skipper, 4 males taken at Clingman's Dome, 8/21/42; 2 females, 8/25/42; near headquarters; at ironweed, 8/25/44; Bascome Creek, 8/30/44; Roaring Fork, 8/19/45, male; on a piece of mouldy bread, 8/15/45, male.

*(20) *Megistias l-herminieri* (Latrelle), the Fuscus Skipper, taken at Ashhopper Branch, 8/12/42; Cade's Cove, 8/13/45.

(21) *Polites taumus* (Fab.) Cade's Cove, 8/13/45 male, 4 females, ditto; Cade's Cove, 8/28/44.

*(22) *Limochoris palatka* Edwards,? A single specimen of apparently this species was taken in the Park in 1945. The specimen was smaller and paler than those taken in Florida but seems definitely to belong to this species though far out of its known range.

The following are in the park collection but were not taken by the author either year:

Lerema accius (Smith and Abbot). Common in Florida
Panoguina ocola (Edwards). Abundant in Florida
Amblyscirtes vialis (Edwards)
Poanes hobomok (Harris)
Thorybes pylades (Scudder)
Erynnis baptisi

DISTRIBUTIONAL NOTES ON TWO SPECIES OF THYSANOPTERA

An Addition to the Thysanoptera of the U. S.

Some months ago, the writer received from William Procter of the Mt. Desert National Park, Maine, a collection of Thysanoptera for identification. Among them was a specimen of a species of *Taeniothrip* collected by him from "Double Phlox" in June of 1945. The writer sent the slide to Dr. Dudley Moulton for identification. Dr. Moulton identified it as *T. atratus* Hal. This, though a common species in Europe, has not heretofore been collected in North America. The slide, returned by Dr. Moulton, is now in the writer's collection. He has specimens of this species collected by the Bureau of Entomology and Plant Quarantine from the following plants from Europe: Asters, Cabbage, Carnations, Castor beans, Clover, Echium vulgare, Heather, and Poppy, showing a wide diversity of host plants.

Frankliniella bratleyi Wats. in Georgia

The writer has received from Theo. L. Bissell of Experiment, Georgia, some specimens of *Frankliniella bratleyi* Wats., which were taken from tuberoses at Thomaston, Georgia. This considerably extends the known range of this species, which was heretofore known only from Gainesville, Florida. It was described from tuberoses (Fla. Ent. XXV, No. 2; June 1942). The writer would be interested in seeing Thysanoptera collected from tuberoses from other localities.

J. R. WATSON

ERRATA

The Florida Entomologist, Vol. XXVII, No. 4. May, 1945.

In the Frontispiece,
"C. C. Wu" above the fig. d should be placed below the fig. e.

Page 62, *Foot-note,*
For "Sceuchuen", read "Szechuen".

Page 63, *line 2,* after "1936", add the following clause,
"and was completed by the end of October, 1937."
in the lines 8-9, cross out the following sentence,
"Due to the scarcity of mulberry trees in Eastern Szechuen, this work was dropped temporarily."
(3) *line 2,*
For the last word, "Chinese", read "English".
(3) *lines 3-4,*
For "are awaiting revision for publication.",
read "have been published."
(5) *lines 2-3,*
For "some concise papers on the insect have been published.",
read "a manuscript in English is awaiting revision for publication."

Page 64, *below figure a,*
"S. T. Djin" is to be crossed out.

Page 67, *Parag. 2, line 4,*
For "and only", read "which, since they are"
line 6,
For "adults", read "pre-adults".
line 7,
Add: "of the roots, and of the root-lets."
Foot-note, line 5,
For "Hops", read "Hope".

Page 67, *Foot-note, line 2,*
For "(McH)", read "(NcH)".

Page 69, *Parag. 3, line 5,* after "Branch-segment", cross out the following:
"and in the trunk of a citrus tree".

Page 70, *Parag. 4, line 3,* after "stood in water", and add "as in fig. 2, a."

Page 71, *Parag. 4, line 4,* cross out the following:
"for about two years."
Parag. 6, lines 3-4, cross out the following:
"measured from the anterior margin of the prothorax to the tip of the abdomen."

Page 72, *Parag. 1, line 7,*
For "these", read "the".
Parag. 2, line 5, cross out the following:
"one of"
Parag. 2, line 8, before "1-8", add the following:
"the abdominal segments".

Page 72, *Parag. 3,* for the last three lines,
Read "The pro- and meso-thoracic legs are sharply bent at the femoro-tibial joints and lie over the elytra, with their tarsi facing each other medio-ventrally. The meta-thoracic legs are bent in a similar way, but partially covered up by the elytra and wings. Lastly, the antennae run posteriorly through the dorsal sides of the femoro-tibial joints of the pro- and meso-thoracic legs, and then coil ventrally to lie over the elytra and wings."

Page 73, *Parag. 2, line 11,* after "while in females", cross out "to".

Page 76, *Parag. 1, line 12,*
For "13 incisions", read "21 incisions".
Parag. 3, line 3,
For "One adult", read "Two adults".

Page 77, *Parag. 5, line 1,*
For "6 a.m.", read "6 p.m."
Parag. 6, line 2,
For "31 days", read "30 days".

Page 78, *Parag. 2, line 4,*
For "Citrus sprayed", read "Citrus spray".
Parag. 3, line 1, after "C. sinensis" add "No. 16".

Page 79, *Table 1,* the *first section* under "Tree or Segment Used",
For "(see text-figure 4, 2)", read "(text-figure 4, e)".
Table 1, the *first section* under "Egg Deposition", *line 2,*
For "June 10-24", read "June 20-24".
Table 1, the *second section* under "No. of Incis.", below the column of figures add a "0" in the line of "Mulb. seedl." on the left-hand side.

Page 85, *Parag. 3, line 5,* before "citrus trunks" cross out the figure, "6".

Page 86, *lines 4 and 5,* add commas after "and" and "occupies".
Parag. 1, lines 8-9,
For "falls to about 50 degrees F.", read "rises to above 55 degrees F. in March and April,".

Page 88, *Parag. 1, lines 3-4,* after "The two adults" add "whose emergence and death were known,".
Parag. 6, line 6,
For "masseniana", read "massomiana".

Page 89, *Table 3,* the *first section* under "Egg Stage",
For "months", read "weeks".
Table 3, the *first section* under "Larval Stage",
For "1-10 months", read "9-10 months".
Under "Natural Enemy", line 1, read "to have no other enemy".
line 3, cross out the word, "burrowing".

Page 89, *under "Distribution", line 6,*
For "Sikeng", read "Sikong".
line 7, after "Chekiang Prov.", add "Hwang-ai".
line 8, before "Shanghai", add "Kiangsu Prov."; and
For "Hopela", read "Hopeh".
line 9,
For "Hupela", read "Hupeh".

Page 91, *line 5,* after "the bark", insert "for a period of about two months".

Page 94, *the last line,* add a hyphen "-" between the 2 words "lime-calcium" and "arsenate".

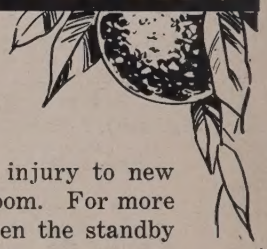
Page 96, *Parag. 2, line 3,* after the word "old", change "." into ","; and add the following words: "while others were 15-16 years old".
line 3, after "completely" add a "," and the following words: "except the lowest portions of about 1 foot long,".
line 4, after "the species" add "*Nadezhdiella cantori,* Hope".
Parag. 4, line 5,
For "*Melanauster chinensis,* Forster",
read "*Nadezhdiella cantori,* Hope".
line 8, after "paste", add the following: "(text-figure 4, b)".
Parag. 5, line 6,
For "portion", read "portions".

Page 98, *under "Killing of the Adults", lines 1-2,* after "Period of Collecting", for the whole sentence,
Read "From the last part of May to the middle of August, every year, look at the basal portions of the trunks and the summer shoots of citrus trees for the adults, and kill all seen."
line 3 from the bottom,
For "40 catties", read "50½ catties".

Listed by K. O. VICTORIA LIEU.

"Black Leaf 40"

KILLS CITRUS APHIS



Protect the fruit and foliage from *Citrus Aphis*. Spray with "Black Leaf 40" while the foliage is young and the infestation is light. Prevent injury to new growth, especially while trees are in bloom. For more than 30 years "Black Leaf 40" has been the standby of particular growers.

ASK YOUR EXPERIMENT STATION

For many years leading authorities have endorsed "Black Leaf 40." It kills insects not only by contact (hitting) but also by fumes. When you mix "Black Leaf 40" with lime-sulphur, oil emulsion, Bordeaux or calcium arsenate, or soap, you convert nicotine sulphate into volatile nicotine with powerful "gassing" properties.

Dusting is often more convenient than spraying on vegetables. The powerful nicotine fumes are released from the dust against the various sucking insects attacking these plants.

"Black Leaf 40" may be added to other standard sprays or dusts. It is highly concentrated, economical—a little goes a long way.

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KILLS BY CONTACT AND FUMES